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UNDERSTANDING QUANTIFIERS AND SCOPE INTERPRETATIONS IN A SECOND LANGUAGE

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This article reviews the main published studies on the acquisition of quantifiers and scope interpretations by adult second language learners, and discusses how this research affects the development of theories in second language acquisition (SLA). It points out that research in this area contributes directly to the understanding of L1 transfer effects and the availability of Universal Grammar (UG) to adult second language learners. Research along this line also sheds light on the issue of how second language acquisition differs from first language acquisition, and thus provides deeper insight into some issues that arise in first language acquisition. Although results of the existing studies seemed favorable to L1 transfer effects and the accessibility to UG, this area of study is still rather new and more innovative research is needed to strengthen the arguments.

INTRODUCTION

Scope interactions between scope-bearers in a sentence have been extensively studied in the area of syntax, semantics, and first language acquisition, but research into this in L2 acquisition is relatively new and published articles remain scarce. However, because different languages display different scope interpretation properties and, more importantly, because scope interpretations are usually not taught explicitly in a classroom setting, studying the acquisition of scope interpretations by learners of a second language from typologically different L1s could provide strong arguments either for or against L1 transfer effects and the accessibility to Universal Grammar among adult second language learners, two important issues that have animated the studies in second language acquisition over the past three decades (White 1989). Studies of L2 acquisition among adult learners can also shed light on the acquisition of scope interpretations in first language acquisition and in what fundamental ways, if any, adult second language acquisition is different from first language acquisition. At the same time, a comparison of the acquisition of scope interpretations by children and adult second language learners can contribute to the understanding of the non-adult-like interpretation of scope phenomenon found in first language acquisition.

This article first introduces scope phenomena displayed in natural languages, and then explores the research questions, methodology and main findings in second language acquisition on quantifiers and scope interpretations, followed by a discussion on the problems with these studies and further research that might be pertinent in this area of L2 acquisition. The last section concludes the whole article.

SCOPE PHENOMENA IN NATURAL LANGUAGES

Sentences containing more than one scope-bearing element may display ambiguity due to the interaction between the scope-bearing elements. For example, the English sentence in (1) contains two quantifiers, *some* and *every*, and the meaning differs depending on which quantifier takes the wider scope. The two interpretations of the sentence in (1) are shown in (2).

- (1) Some boy loves every girl.
- (2) a. There is a boy *x* such that for every girl *y*, *x* loves *y*. (*some* > *every*)
b. For every girl *y*, there is at least one (possibly different) boy *x* such that *x* loves *y*. (*every* > *some*)

As shown in (2a), the sentence in (1) can express the meaning that there is a boy who likes every girl when *some* takes scope over *every*; the sentence in (1) can also mean that for every girl, there is a boy who

likes her, when *every* takes scope over *some* (2b).

The sentence in (1) shows scope ambiguity caused by the interaction between different quantifiers. In addition to quantifiers, *wh*-words and negation are also scope-bearing elements, whose interactions with quantifiers can give rise to different interpretations of the sentence containing them. For example, the sentence in (3) shows ambiguity caused by the interaction between a *wh*-word and a quantifier, and the sentence in (4) shows different interpretations caused by the interaction between negation and a numerical quantifier (Jackendoff 1972; Hornstein 1984; Musolino 1998; Musolino *et al.* 2000; Lidz and Musolino 2002; Musolino and Lidz 2006; Su 2003; Liu 1997; Huang 1981; Huang 1982; Lee 1986).

(3) What did everyone buy?

- a. What did each person buy in common? (What > every)
- b. For each person, what did that person buy? (every > what)

(4) The boy didn't read two books.

- a. It is not the case that the boy read two books. (not > two)
- b. There are two books that the boy did not read. (two > not)

The sentence in (3) might be interpreted as a question asking something that everyone bought in common where the scope of *what* is greater than the scope of *every*. The answer to this question is just a single object. This sentence can also be understood as asking to list things that each person bought, such as *John bought a book, Tom bought a pen...* etc, where *every* takes wider scope than *what*. Similarly, when negation takes a wider scope than the numerical quantifier, the sentence in (4) expresses the meaning that *it is not the case that the boy read two books* (4a); when the numerical quantifier takes scope priority, however, the sentence in (4) means that *there are two books (out of many) that the boy did not read* (4b).

Scope-bearing elements, however, do not interact with each other in the same way in all languages. As a result, sentences containing two scope-bearing elements might be ambiguous in one language, but its counterparts in another language might not be ambiguous at all. For example, the Japanese counterpart of the English sentence in (3), shown in (5), only allows a reading in which the *wh*-word *nani* 'what' takes a wider scope than the quantifier *daremo* 'everyone', and thus only allows an individual answer, but not a pair-list answer (Hoji 1985; Yoshida 1995; Saito 1999).

(5) Japanese: Nani-o daremo-ga katta no?

what-Acc everyone-Nom bought Q

'What did everyone buy?'

- a. Individual answer: (Each person bought) a book.
- b. *Pair-list answer: Kate bought a book and a pen, Tom bought a book and a newspaper, Anna bought a book and some postcards...

Another example is shown in (6), which is the Chinese counterpart of the English sentence in (4). The Chinese sentence in (6) also contains negation and a numerically quantified NP in the object position, but it is not ambiguous as is its English counterpart. The only permissible interpretation of the Chinese sentence in (6) is the one in which negation takes wider scope over the numerical quantifier as shown in (6a). An interpretation where the numerical quantifier takes scope over negation is not available in Chinese (Su 2003; Liu 1997; Huang 1981; Huang 1982; Lee 1986).

(6) Chinese: zhe-ge nanhair meiyou kan liang-ben shu.

this-classifier boy NEG read two-classifier book

'This boy didn't read two books.'

- a. It is not the case that the boy read two books. (not > two)
- b. *There are two books that the boy did not read. (two > not)

Due to the subtlety and complexity of scope interpretations in different languages, studies of the acquisition of scope interpretations in a second language can shed light on the understanding of the underlying mechanism of both second and first language acquisition. As a developing area, it has drawn more and more attention from linguists interested in research in second language acquisition.

L2 RESEARCH ON THE ACQUISITION OF SCOPE INTERPRETATIONS

Research questions

Comparisons between child language acquisition and second language acquisition on quantifiers and scope interpretations

Some studies on the acquisition of quantifiers and scope interpretations are inspired by studies in first language acquisition and aim to answer the question of whether adult second language learners perform similarly to child language learners of the target language when it comes to the acquisition of quantifiers and scope interpretations.

The acquisition by children of quantifiers and scope interpretations in various languages, especially English, has been extensively studied (Philip 1991, 1992, 1995; Lidz and Musolino 2002; Musolino *et al.* 2000; Lee 1986; Su 2001; among others). L1 English-speaking children pass through a phase when their interpretation of sentences containing quantifiers is markedly different from that of adults. Two different analyses have been advanced to account for this. One perspective interprets the responses as a reflection of one of the natural developmental stages of quantification that children experience (Philip 1991, 1992, 1995). The other view, held by Crain *et al.* (1996), is that the children's performance reflects their immature pragmatic ability. These two analyses make different predictions for L2 acquisition. According to DelliCarpini (2003), Philip's thesis predicts that L2 adult learners of English will follow similar developmental stages that children do if Universal Grammar regulates the developmental stages of quantification. However, Crain's theory predicts that L2 adult English learners will perform differently from English-speaking children since adult learners already have their pragmatic knowledge in place. Therefore, a test with L2 adult English learners would help clarify the way quantifiers are acquired in first language acquisition. DelliCarpini (2003) aimed to address this issue by investigating the acquisition of a so-called "quantifier spreading" phenomenon found among English-speaking children using adult English learners.

One of the main findings in L1 acquisition studies of Neg-NumP interaction is the existence of isomorphism effects. Isomorphism effects refer to children's performance in accepting an isomorphic reading while rejecting a non-isomorphic reading in scope interpretations (Musolino 1998). Lidz and Musolino (2002) further explore the underlying mechanisms that may account for the isomorphism effects, concluding that isomorphism effects shown by English-speaking children are a result of following the c-command relation in scope interpretations. However, Su (2003) reported that Chinese children do not follow the c-command relation in assigning scope interpretation. Do L2 learners of Chinese pattern with Chinese-speaking children in interpreting sentences containing negation and numerically quantified NPs in the object position? This is one of the research questions Li (2006) addressed. Studies along this research line contribute to the question of whether child L1 language acquisition is fundamentally different from adult L2 acquisition. (Bley-Vroman 1988)

L1 transfer effects and UG accessibility

Other studies on scope interpretations in second language acquisition focused on the investigation of the L1 transfer effects and the accessibility to Universal Grammar by adult L2 learners (Li 2006; Marsden 2008).

Results of some experimental studies of second language acquisition show that L1 transfer effects exist in different areas, such as binding in English (in L1 Korean, L2 English: Lee and Schachter 1998; Akiyama 2002), aspect in Spanish (in L1 English, L2 Spanish: Slabakova and Montrul 2003; Gabriele *et al.* 2003), and articles in English (in L1 Spanish/Russian, L2 English: Ionin *et al.* 2008). Do L1 transfer effects also

exist in the acquisition of scope interpretations? If L2 learners transfer their L1 settings in scope interpretations into their L2, the predictions for their performance in L2 would be that learners whose L1 has different settings would perform differently in L2 in the initial states. If L2 learners do not transfer their L1 settings of scope interpretations, it would be predicted that L2 learners would perform the same regardless of the settings of their L1s. This is one of the central research questions in Li (2006) and Marsden (2008).

A second question related to L1 transfer effects is related to L2 learnability, which has been discussed together with the availability of Universal Grammar to adult L2 learners. With respect to L2 syntactic knowledge, White (1989) pointed out that if the interlanguage grammar is influenced by the L1, then fossilization might occur when the target language grammar represents a subset of the possibilities available in the L1. Because of this interference, L2 learners may never be able to retreat from the superset L1-based knowledge due to the lack of negative input or explicit teachings. Therefore, L2 learners face a similar poverty-of-the-stimulus problem as L1 learners do (Chomsky 1980: 34). If L2 learners, like L1 learners, can actually acquire native-like performance under the severe poverty-of-the-stimulus, it would constitute a strong argument for the availability of Universal Grammar to adult second language learners with the assumption that there are only three sources of linguistic knowledge available to L2 learners: L2-input, L1-transfer and UG (Schwartz and Sprouse 2000; White 2003). Does a similar learnability problem also exist at the syntax-semantics interface as evidenced by scope interpretations? If learners do transfer the scope interpretations of their L1 to the target language, can they acquire native-like interpretation when their proficiency improves? This is another intriguing research question asked in studies of adult L2 acquisition (Li 2006; Marsden 2008).

Methodology

The methodology used in the existing L2 studies in scope interpretations includes a picture identification task (DelliCarpini 2003; Marsden 2008), a truth value judgment task (DelliCarpini 2003; Li 2006) and a picture acceptability judgment task (Marsden 2008). All of these methodologies aim to accurately reveal the subject's interpretation of the test sentences in a natural and realistic way by providing contexts in which the test sentences are interpreted.

DelliCarpini (2003) tested how L2 English learners with different first languages interpreted sentences that contain a universal quantifier and an existential quantifier such as those in (7) via a picture identification task and a story task that uses the Truth Value Judgment methodology.

(7) Scenario: $F1 \leftrightarrow D1$ $F2 \leftrightarrow D2$ $F3 \leftrightarrow D3$ $F4$ (DelliCarpini 2003: 1, Ex.1)

(F = farmer and D = donkey and \leftrightarrow = feeding)

- a. "Is a farmer feeding every donkey?"
- b. "Is every farmer feeding a donkey?"

In the picture identification task, the participants were either shown pictures and asked yes/no questions in written format, or were shown a page with two or four pictures and asked to match the test sentence to the appropriate picture.

The story task in DelliCarpini (2003) used the Truth Value Judgment methodology (Crain and McKee 1985). The TVJT is an experimental technique used to assess language users' interpretation of sentences by presenting a context in which test sentences must be evaluated. In DelliCarpini's (2003) story task, short stories were read by the participants and then a descriptive statement of what 'happened' followed. The participant had to answer in writing if this was an accurate description of the story or not. Li (2006) also employed the Truth Value Judgment methodology, but presented the context stories to the participants

in a different way. In Li's (2006) test, the contexts were presented to the subjects through a series of short videotaped stories acted out and narrated by puppets. Another puppet, Piglet, presented the test sentence at the end of each story. Subjects were asked to indicate whether they thought the test sentence could be true according to the context along with a brief justification of why they thought so. The test stories were constructed in such a way as to make one of the readings true and the other false in a specific context. Therefore, a subjects' 'yes' answer accompanied by proper justification could be taken as a sign that they accepted a specific reading in that context.

Marsden (2008) used a picture acceptability task to investigate how English, Chinese, and Korean-speaking learners of Japanese interpreted Japanese questions with a *wh*-object and a universally quantified subject such as the sentence in (5). In the test, a picture, which provides a plausible context for either an individual or a pair-list answer, was first projected onto a screen at the front of the test room for ten seconds. The question and answer were then revealed below the picture. At the same time, the question and answer were presented orally. The picture and the question and answer were viewed together for 15 seconds before proceeding to the next test item. Using a scale (-2 , -1 , $+1$, $+2$; and cannot decide), participants were asked to indicate on their answer sheet how possible they found each answer in the context of the question and the picture.

Main findings

The empirical studies of the acquisition of quantifiers and scope interpretations have shown that adult L2 learners of English experience a similar stage of misinterpretation of quantifiers (DelliCarpini 2003) as child L1 English learners, that L1 transfer effects are evident (DelliCarpini 2003; Li 2006; Marsden 2008), and that L2 learners can acquire the native-like interpretations even under severe "poverty of the stimulus" (Li 2006; Marsden 2008).

The test results in DelliCarpini (2003) showed that L2 learners of English performed similarly to English-speaking children in misinterpreting quantifiers regardless of their L1s. Moreover, subjects whose L1 is similar to English in terms of quantification seem to move through the stage of misinterpretation of quantifiers more rapidly than subjects whose L1 has different settings from English. In other words, low-proficiency subjects had similar error rates regardless of L1s, but high-proficiency student error rates correlated to their L1 settings: subjects whose L1 is similar to English had fewer errors than those whose L1 is different from English. DelliCarpini interpreted these results as evidence that adult L2 English learners undergo the same developmental stages as child L1 English learners, and suggested that children's problems in interpreting such sentences may be caused by an immature grammar and not by lack of knowledge of pragmatics. DelliCarpini reported L1 transfer effects in his test results and argued that Universal Grammar plays a role in the interpretation and acquisition of quantification in second language acquisition.

Li (2006) tested beginners, intermediate and advanced English-speaking learners of Chinese. The results indicated that the groups of beginners and intermediate learners of Chinese accepted the reading that is allowed in the subjects' L1 (English) but disallowed in the target language (Chinese). This was interpreted as an indicator of L1 transfer effects. The results also showed that, although starting out with two readings, advanced learners were successfully able to 'unlearn' the reading that does not exist in Chinese and acquire native-like interpretation. This, as argued by the author, is because Universal Grammar is available to help L2 learners acquire the ability to correctly interpret Chinese sentences containing negation and numerically quantified NPs in the object position.

The results from Marsden (2008) are compatible with the Full Transfer Full Access model of L2 acquisition (Schwartz and Sprouse 1994, 1996). Marsden (2008) tested the L1 transfer effects with Japanese learners from typologically different L1s: Korean, English and Chinese. However, the results of the test with native Korean speakers as a control group actually revealed that, contrary to what had been claimed in the

linguistic literature, Korean actually allows a pair-list reading for the Korean counterpart of the sentence in (5). Japanese learners in the intermediate groups performed similarly across the three L1s (English, Chinese and Korean): They generally accepted pair-list answers in Japanese. Advanced learners, as a group, tended to accept pair-list answers. However, some advanced learners showed native-like rejection of pair-list readings. The conclusion drawn by Marsden (2008) is that target-like L2 knowledge of scope interpretations can be acquired even if the target form is interpretively more restrictive than the equivalent L1 form. In other words, L2 learners can acquire knowledge of the absence in the target language of a possibility that exists in their L1. This argument might imply that Universal Grammar constraints operate at the L2 syntax-semantics interface.

PROBLEMS AND FUTURE PROSPECTS OF L2 RESEARCH ON THE ACQUISITION OF SCOPE INTERPRETATIONS

Although L2 studies on the acquisition of quantifiers and scope interpretations have come up with some interesting conclusions, the acquisition of scope interpretations is a rather new area of study, and calls for more attention from linguists. Several aspects of the study of the acquisition of quantifiers and scope interpretations need to be strengthened in future studies.

The first aspect is one of L1 transfer effects. All of the studies reviewed here argued for L1 transfer effects, however, none of these studies arrived at this conclusion by comparing the performance of learners on the same scope phenomenon from typologically different L1s, a comparison which would, in fact, provide the strongest argument for L1 transfer effects. While DelliCarpini (2003) did test subjects with different first languages, except for the group of Chinese-speaking learners (N=10 in Group 1 and 2) and Spanish-speaking learners (N=10 in Group 1, and N=8 in Group 2), there were fewer than 6 learners with the same first languages. Such a small number of subjects in each L1 group makes it hard to perform any meaningful statistical analysis. Li (2006) only tested English-speaking learners of Chinese, but did not test subjects with other native languages. Marsden (2008) designed the task to test learners with typologically different L1s (Korean, English and Chinese), and found, surprisingly, that Korean actually allowed a pair-list reading for sentences containing a *wh*-word and a quantifier. As a result, all the L1s tested in Marsden (2008) allowed the pair-list reading. This unexpected finding affects the strength of Marsden's (2008) argument for L1 transfer effects. Transfer effects thus stand as one of the possible explanations of L2 learners' performance on scope interpretations, but not the only possibility in these studies. Therefore, further research is needed to fully test out the L1 transfer effects in the acquisition of quantifiers and scope interpretations.

Moreover, studies that have been done on the acquisition of scope interpretations by L2 learners have mainly been focused on the English, Chinese, and Japanese languages. It would be very revealing and informative if more languages were investigated. Some bi-directional studies would also be welcome.

The second related aspect is the availability of Universal Grammar to adult second language learners. Although DelliCarpini (2003), Li (2006) and Marsden (2008) all argued for UG accessibility to adult second language learners, if L1 transfer effects are not fully confirmed, the argument for UG accessibility remains weak. Actually, Marsden's (2008) showed that only a few advanced learners could successfully reject an interpretation that is not allowed in the target language. Does this mean that UG is only available to some L2 learners, but not others? This definitely calls for further investigation.

The learnability issues in scope interpretations could bear deeper investigation. Even if it is as accepted that Universal Grammar helps adult second language learners acquire the ability to correctly interpret sentences in the target languages, a question arises: How does Universal Grammar work in this area? Does it work through input or is it triggered by other settings in the target language? What are the initial settings of scope interpretations? We know almost nothing of this aspect. Further research will not only

deepen our understanding of the acquisition of scope interpretations, but also provide us with a better understanding of second language learning in general.

CONCLUSION

Research on the acquisition of quantifiers and scope interpretations in second language learning closely relates two of the central research questions in the study of second language acquisition: (1) Do L2 learners transfer their L1 settings to their L2 in the initial stages of L2 acquisition? (2) Is Universal Grammar available to adult second language learners? The existing studies provide semi-positive answers to both questions, but further research is needed to strengthen the arguments. In addition to the aforementioned research questions in the field of second language acquisition, research on the acquisition of quantifiers and scope interpretations can also deepen the understanding of first language acquisition on scope phenomena, and can contribute to the answering of certain questions about first language acquisition viewed from a different angle. Since this is a new area of study, there is a lot of room for innovative research.

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